

PATENT ABSTRACTS OF JAPAN

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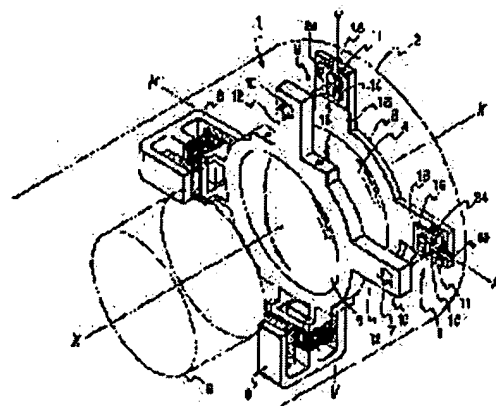
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(54) POSITION SENSOR FOR IMAGE BLUR CORRECTING OPTICAL SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To improve position detecting accuracy for a movable lens, in an image blur correcting optical system.

SOLUTION: This position sensor is constituted of light emitting elements 10 and light receiving elements 11 for receiving light projected from the light emitting elements 10. The light receiving elements 11 are fixed on light receiving element holders 16 and simultaneously, attached to a fixing member 3 for the image blur correcting optical system 1 or the movable member 7, with the light emitting element holders 16. These holders 16 can be attached to the fixing member 3 for the image blur correcting optical system 1, in the adjustable state of positional relations with one of segments extended in two directions perpendicular to a direction where the position of the movable lens 5 is detected by the light receiving elements 11.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the position sensor which detects the location of a moving lens in the optical system for image deflection amendment.

[0002]

[Description of the Prior Art] It sets to an image pick-up device, for example, a handicap type video camera, the afocal lens which consists of a convex lens and a concave lens ahead of an image pick-up lens system is arranged as optical system for image deflection amendment as a method which amends the image deflection by the hand deflection at the time of photography etc., one of these convex lenses and the concave lenses is used as a moving lens, and the method which amends an image deflection is learned by moving this in the direction which intersects perpendicularly with an optical axis.

[0003] If it is in this method, the location of a moving lens must be detected, the location of a moving lens is divided into the component of the 2-way which intersects perpendicularly (henceforth the "convention direction"), for example, a horizontal direction, and a perpendicular direction as the means, and the amount of displacement of the location in each direction is detected in two position sensors. And generally this position sensor has the light emitting device which consists of LED, and the photo detector which consists of PSD. In addition, the light-receiving side of PSD is formed in abbreviation band-like, and the longitudinal direction of this light-receiving side is the detection direction (henceforth the "detection direction") of the location of the moving lens of PSD.

[0004] Furthermore, in order to detect the amount of displacement of the moving lens of the optical system for image deflection amendment to accuracy, the detection direction of two PSD(s) needs to extend along the above-mentioned convention direction, and, moreover, will be direct gone mutually to accuracy by the detection direction of two PSD(s), respectively.

[0005] Drawing 5 is to show an example of the means of attachment of the conventional PSD roughly. That is, in drawing 5, PSDa is fixed so that the criteria walls e and f prepared in the member side to which the location of the optical system for image deflection amendment was fixed may be exactly contacted in the two side faces c and d with two springs b and b. And the above-mentioned criteria wall e is prolonged in the convention direction g and parallel, the criteria wall f is formed so that it may intersect perpendicularly with the criteria wall e and the convention direction g, and an appearance looks at PSDa superficially, it succeeds in a rectangle to accuracy (appearance precision), and the design top is prescribed that the detection direction i by the light-receiving side h grows into one side faces (side face c etc.) and parallel.

[0006] Therefore, theoretically, if the appearance precision of PSDa and relation with the detection direction i by the light-receiving side h are as a design, the convention direction g and the detection direction i come to be in agreement.

[0007] However, it is not realistic for there to be tolerance in the configuration of side faces c and d etc., it to actually become difficult in PSDa, to double the detection direction i in the convention direction g with the appearance precision of PSDa, since the appearance precision of PSD with general-purpose

many is inadequate for using it as that of a position sensor a cost rise, since PSD with a good appearance precision is expensive, and to use this.

[0008] Then, in order to solve the above-mentioned problem, it does not depend on the appearance precision of PSDa, but PSDa is attached in the photo detector holder j, and this photo detector holder j is made to engage with the notching l of the mounting section k prepared in the member side to which the location of the optical system for image deflection amendment was fixed in another conventional example shown in drawing 6. And in order to make in agreement the convention direction g and the detection direction i and to abolish the error of detection of the location of a moving lens, Spacer m is inserted between the photo detector holder j and the mounting section k, and he adjusts and is trying to fix by adjusting spacing in the meantime, so that the detection direction i may be in agreement with the convention direction g.

[0009]

[Problem(s) to be Solved by the Invention] however, in order to put Spacer m between the photo detector holder j and the mounting section k and to make in agreement the detection direction i and the convention direction g also in the conventional example shown in above-mentioned drawing 6 R> 6 Many spacers m with which thickness differs are needed with the individual difference of PSD. It will adjust exchanging the spacer m with which thickness differs until the difference of the detection direction i and the convention direction g serves as tolerance, it is inefficient-like, and since components mark also increase, there is a new problem of leading also to a cost rise.

[0010] Therefore, the trouble in the above-mentioned conventional example is canceled, and the position sensor of the optical system for image deflection amendment which makes min the error of location detection of the moving lens by the position sensor is called for.

[0011]

[Means for Solving the Problem] The position sensor of the optical system for this invention optical-axis amendment consists of a light emitting device and the photo detector which receives the light irradiated from this light emitting device. A photo detector While fixing to a photo detector holder, it is made to attach in the holddown member or moving-part material of the optical system for image deflection amendment through this photo detector holder. A photo detector holder It is made to attach in the member to which the location of the optical system for image deflection amendment was fixed in the condition that the physical relationship of one of the segments prolonged in the 2-way which is the detection direction of the location of the moving lens by the photo detector, and which intersected perpendicularly can be adjusted.

[0012] Therefore, the detection direction of the location of the moving lens by the photo detector can be doubled now in the predetermined direction.

[0013]

[Embodiment of the Invention] Below, the gestalt of operation of the position sensor of the optical system for this invention image deflection amendment is explained according to the example shown in the accompanying drawing.

[0014] In addition, the illustrated example divides the location of the moving lens in the optical system for image deflection amendment into the component of the 2-way which intersected perpendicularly, for example, the direction of a horizontal (H) and the direction of vertical (V), and detects the location of the moving lens in each direction by two position sensors. Moreover, only the position sensor (what is prolonged in the direction of V-V in drawing 1) which detects the location of the direction of V since the same thing is used if attached to the two above-mentioned position sensors is explained to a detail. The explanation is omitted by ***** which gives the same sign as the sign given to the same part in the position sensor which detects the location of the direction of V to each part if attached to the position sensor (what is prolonged in the direction of H-H in drawing 1) which detects the direction of H.

[0015] The optical system 1 for image deflection amendment constitutes the afocal optical system which has the fixed lens 4 of the biconcave lens attached in the fixed lens holder 3 which is the holddown member which is located most ahead and fixed to a lens barrel 2 by the proper means, and the moving lens 5 of the biconvex lens located behind this fixed lens 4.

[0016] The image pick-up lens system 6 has two or more lenses which are not illustrated, and is behind the optical system 1 for image deflection amendment (the direction which goes to the right slanting upper part in drawing 1 is made into the front, the direction which goes to a left slanting lower part is made into back, the direction which goes to the left slanting upper part is made into a left, and the direction which goes to a right slanting lower part is made into the method of the right.). In expressing a direction in the following explanation, it shall depend in this direction. It is arranged. That is, a moving lens 5 is located ahead of the image pick-up lens system 6.

[0017] The moving lens 5 which is moving-part material is attached in the movable lens holder 7 which carried out the shape of an abbreviation ring, and this movable lens holder 7 is moved in said direction of H, and the direction of V by the driving means 8 and 8 of a moving coil type, for example while it is supported maintaining a condition parallel to the fixed lens 4 by two suspensions which are not illustrated so that it may be movable.

[0018] Position sensors 9 and 9 are arranged on the V-V line which intersected perpendicularly mutually as a core, and the H-H line in optical-axis X-X of the image pick-up lens system 6, in order to consist of LED 10 and 10 which forms a light emitting device, and PSD 11 and 11 which forms a photo detector and to detect the location of a moving lens 5 in the direction of V, and the direction of H. As LED 10 and 10 is shown in drawing 1, the luminescence side is attached in the light emitting device mounting pieces 12 and 12 which were formed in the upper bed section and the left end section of the above-mentioned movable lens holder 7, and protruded on one toward the method of outside where the front is turned to. Moreover, PSD 11 and 11 is attached so that the fixed lens holder 3 may be countered with LED 10 and 10 at the photo detector fixed parts 13 and 13 by which projection formation was carried out in the direction of V, and the direction of H. In addition, the light-receiving sides 14 and 14 which carried out abbreviation band-like are established in the front face of PSD 11 and 11. The longitudinal directions of the light-receiving sides 14 and 14 which carried out band-like [this] are the detection directions 15 and 15 of PSD.

[0019] PSD 11 and 11 is fixed in the center of the principal pieces 17 and 17 of the photo detector holders 16 and 16 by proper approaches, such as adhesion or soldering, respectively, as shown in drawing 2 thru/or drawing 4 R> 4. The above-mentioned principal piece 17 succeeds in tabular [of an abbreviation rectangle], and projection formation of the stop section 19 is carried out for the adjustment arm 18 toward the left at one at one toward the upper part from the left end of a projection and the upper part of a principal piece 17 from the upper part of this principal piece 17.

[0020] And in the center of the rear face of the principal piece 17 of each photo detector holder 16, while projection formation of the engagement hole 20 is carried out at one, since the photo detector holder 16 rotated so that it may mention later is fixed in the location of arbitration, the long hole 21 on which an opening edge draws the locus of the shape of radii centering on the above-mentioned engagement hole 20 is formed in the stop section 19. In addition, PSD11 is prescribed in general that the detection direction 15 comes to a passage, and the center section comes right above the above-mentioned engagement hole 20 to the location of the engagement hole 20, when fixed to the photo detector holder 16.

[0021] Furthermore, the engagement projections 22 and 22 for engaging with the photo detector fixed parts 13 and 13 loosely with the engagement holes 20 and 20 of the above-mentioned photo detector holders 16 and 16, and supporting this to revolve are formed. He is trying, as for the above-mentioned engagement projections 22 and 22, for a V-V line or a H-H line to pass along the core. In addition, instead of forming the engagement projection 22 in the photo detector holder 16 at the photo detector fixed part 13 of the engagement hole 20 and the fixed lens holder 3, an engagement projection is prepared in the photo detector holder 16, and you may make it prepare an engagement hole in the photo detector fixed part 13 of the fixed lens holder 3 like this example.

[0022] A deer is carried out, and before PSD 11 and 11 attaches the moving lens 5 held at the movable lens holder 7 which is moving part at the lens barrel 2, its drive, etc., it is attached in the photo detector fixed parts 13 and 13 of a lens barrel 2 as follows.

[0023] The engagement projection 22 is made to engage with the engagement hole 20 of the photo

detector holder 16 with which PSD11 was fixed in each photo detector fixed part 13 of the fixed lens holder 3. Then, in this condition, the photo detector holder 16 will be in the condition of having been attached in the photo detector fixed part 13 free [rotation] focusing on the engagement projection 22. [0024] Next, it is made for the detection directions 15 and 15 of PSD 11 and 11 to serve as predetermined sense so that PSD 11 and 11 can detect migration of a moving lens 5 to accuracy as an amount of displacement in the direction of V, or the direction of H.

[0025] That is, the fixed lens holder 13 is first attached in an include-angle adjustment fixture (only the part mentioned later is illustrated about an include-angle adjustment fixture.). In addition, while he is trying to be moved in the direction of V, or the direction of H along with a V-V line or a H-H line at accuracy and the light emitting device irradiates the light from a light emitting device at PSD 11 and 11, respectively, it is made to have the detection direction of the location of the moving lens by PSD 11 and 11 adjusted although an include-angle adjustment fixture avoids reference about the detailed structure.

[0026] The output of PSD 11 and 11 is measured moving the light emitting device which consists of LED of the above-mentioned include-angle adjustment fixture etc. along with a V-V line or a H-H line in the direction of V, or the direction of H, the photo detector holder 16 is rotated in the direction of a clockwise rotation, or the counter clockwise direction so that the output of PSD 11 and 11 may become the optimal, and it is made to make the detection direction 15 in agreement with a V-V line or a H-H line.

[0027] And finally, temporary immobilization of the adjustment arm 18 is pinched and carried out at some include-angle adjustment fixtures 23 so that the photo detector holder 16 may not move, a screw 24 is inserted in in the long hole 21 of the stop section 19, the head is screwed in the screw hole 25 of the photo detector fixed part 13, and the photo detector holder 16 is fixed to the photo detector fixed part 13.

[0028] In addition, adjustment cost to adjust them, as the opening length in the longitudinal direction of the long hole 21 of the photo detector holders 16 and 16 described above the detection directions 15 and 15 of PSD 11 and 11 is determined by whether it is the need how much.

[0029] Thus, it sets to the position sensor of the optical system for this invention image deflection amendment. The ** which does not need components, such as a spacer which has various thickness by rotating the photo detector holder with which PSD was fixed, Even if it can adjust so that the detection direction of the location of the moving lens by PSD may be simply made in agreement with a V-V line or a H-H line, and it uses PSD with an inadequate appearance precision, it becomes possible to acquire the detection precision of the location of enough moving lenses, and becomes advantageous in respect of mass production nature and cost.

[0030] Moreover, by giving the precision needed in order to double the detection direction of PSD in the predetermined direction to an include-angle adjustment fixture, process tolerance of each part in connection with mounting of PSD can be made loose, and it becomes possible to lower a manufacturing cost.

[0031] In addition, although what attached PSD 11 and 11 (photo detector) in the fixed lens holder 3 (holddown member), and attached LED 10 and 10 in the movable lens holder 7 (moving-part material) was shown, LED 10 and 10 may be attached in the fixed lens holder 3, and you may make it attach PSD 11 and 11 in reverse with this in the above-mentioned example at the movable lens holder 7.

[0032]

[Effect of the Invention] So that clearly from the place indicated above the position sensor of the optical system for this invention image deflection amendment It consists of a light emitting device and the photo detector which receives the light irradiated from this light emitting device. A photo detector While fixing to a photo detector holder, it is made to attach in the holddown member or moving-part material of the optical system for image deflection amendment through this photo detector holder. A photo detector holder Since it was made to attach in the member to which the location of the optical system for image deflection amendment was fixed in the condition that the physical relationship of one of the segments prolonged in the 2-way which intersected perpendicularly with the detection direction of the location of the moving lens by the photo detector can be adjusted The detection direction of the location

of the moving lens of a photo detector can be easily adjusted in the direction of the right, and it becomes possible to acquire the detection precision of the location of a high moving lens regardless of the precision of a photo detector, and becomes advantageous in respect of mass production nature and cost. [0033] In addition, it does not pass over the concrete configuration and the structure which were shown in said example to what showed a mere example of the somatization which hits carrying out this invention, and the technical range of this invention is not restrictively interpreted by these.

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EFFECT OF THE INVENTION

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the position sensor which detects the location of a moving lens in the optical system for image deflection amendment.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] It sets to an image pick-up device, for example, a handicap type video camera, the afocal lens which consists of a convex lens and a concave lens ahead of an image pick-up lens system is arranged as optical system for image deflection amendment as a method which amends the image deflection by the hand deflection at the time of photography etc., one of these convex lenses and the concave lenses is used as a moving lens, and the method which amends an image deflection is learned by moving this in the direction which intersects perpendicularly with an optical axis.

[0003] If it is in this method, the location of a moving lens must be detected, the location of a moving lens is divided into the component of the 2-way which intersects perpendicularly (henceforth the "convention direction"), for example, a horizontal direction, and a perpendicular direction as the means, and the amount of displacement of the location in each direction is detected in two position sensors. And generally this position sensor has the light emitting device which consists of LED, and the photo detector which consists of PSD. In addition, the light-receiving side of PSD is formed in abbreviation band-like, and the longitudinal direction of this light-receiving side is the detection direction (henceforth the "detection direction") of the location of the moving lens of PSD.

[0004] Furthermore, in order to detect the amount of displacement of the moving lens of the optical system for image deflection amendment to accuracy, the detection direction of two PSD(s) needs to extend along the above-mentioned convention direction, and, moreover, will be direct gone mutually to accuracy by the detection direction of two PSD(s), respectively.

[0005] Drawing 5 is to show an example of the means of attachment of the conventional PSD roughly. That is, in drawing 5, PSDa is fixed so that the criteria walls e and f prepared in the member side to which the location of the optical system for image deflection amendment was fixed may be exactly contacted in the two side faces c and d with two springs b and b. And the above-mentioned criteria wall e is prolonged in the convention direction g and parallel, the criteria wall f is formed so that it may intersect perpendicularly with the criteria wall e and the convention direction g, and an appearance looks at PSDa superficially, it succeeds in a rectangle to accuracy (appearance precision), and the design top is prescribed that the detection direction i by the light-receiving side h grows into one side faces (side face c etc.) and parallel.

[0006] Therefore, theoretically, if the appearance precision of PSDa and relation with the detection direction i by the light-receiving side h are as a design, the convention direction g and the detection direction i come to be in agreement.

[0007] However, it is not realistic for there to be tolerance in the configuration of side faces c and d etc., it to actually become difficult in PSDa, to double the detection direction i in the convention direction g with the appearance precision of PSDa, since the appearance precision of PSD with general-purpose many is inadequate for using it as that of a position sensor a cost rise, since PSD with a good appearance precision is expensive, and to use this.

[0008] Then, in order to solve the above-mentioned problem, it does not depend on the appearance precision of PSDa, but PSDa is attached in the photo detector holder j, and this photo detector holder j is made to engage with the notching l of the mounting section k prepared in the member side to which the

location of the optical system for image deflection amendment was fixed in another conventional example shown in drawing 6 . And in order to make in agreement the convention direction g and the detection direction i and to abolish the error of detection of the location of a moving lens, Spacer m is inserted between the photo detector holder j and the mounting section k, and he adjusts and is trying to fix by adjusting spacing in the meantime, so that the detection direction i may be in agreement with the convention direction g.

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EFFECT OF THE INVENTION

[Effect of the Invention] So that clearly from the place indicated above the position sensor of the optical system for this invention image deflection amendment It consists of a light emitting device and the photo detector which receives the light irradiated from this light emitting device. A photo detector While fixing to a photo detector holder, it is made to attach in the holddown member or moving-part material of the optical system for image deflection amendment through this photo detector holder. A photo detector holder Since it was made to attach in the member to which the location of the optical system for image deflection amendment was fixed in the condition that the physical relationship of one of the segments prolonged in the 2-way which intersected perpendicularly with the detection direction of the location of the moving lens by the photo detector can be adjusted The detection direction of the location of the moving lens of a photo detector can be easily adjusted in the direction of the right, and it becomes possible to acquire the detection precision of the location of a high moving lens regardless of the precision of a photo detector, and becomes advantageous in respect of mass production nature and cost. [0033] In addition, it does not pass over the concrete configuration and the structure which were shown in said example to what showed a mere example of the somatization which hits carrying out this invention, and the technical range of this invention is not restrictively interpreted by these.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] however, in order to put Spacer m between the photo detector holder j and the mounting section k and to make in agreement the detection direction i and the convention direction g also in the conventional example shown in above-mentioned drawing 6 R> 6 Many spacers m with which thickness differs are needed with the individual difference of PSD. It will adjust exchanging the spacer m with which thickness differs until the difference of the detection direction i and the convention direction g serves as tolerance, it is inefficient-like, and since components mark also increase, there is a new problem of leading also to a cost rise.

[0010] Therefore, the trouble in the above-mentioned conventional example is canceled, and the position sensor of the optical system for image deflection amendment which makes min the error of location detection of the moving lens by the position sensor is called for.

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MEANS

[Means for Solving the Problem] The position sensor of the optical system for this invention optical-axis amendment consists of a light emitting device and the photo detector which receives the light irradiated from this light emitting device. A photo detector While fixing to a photo detector holder, it is made to attach in the holddown member or moving-part material of the optical system for image deflection amendment through this photo detector holder. A photo detector holder It is made to attach in the member to which the location of the optical system for image deflection amendment was fixed in the condition that the physical relationship of one of the segments prolonged in the 2-way which is the detection direction of the location of the moving lens by the photo detector, and which intersected perpendicularly can be adjusted.

[0012] Therefore, the detection direction of the location of the moving lens by the photo detector can be doubled now in the predetermined direction.

[0013]

[Embodiment of the Invention] Below, the gestalt of operation of the position sensor of the optical system for this invention image deflection amendment is explained according to the example shown in the accompanying drawing.

[0014] In addition, the illustrated example divides the location of the moving lens in the optical system for image deflection amendment into the component of the 2-way which intersected perpendicularly, for example, the direction of a horizontal (H) and the direction of vertical (V), and detects the location of the moving lens in each direction by two position sensors. Moreover, only the position sensor (what is prolonged in the direction of V-V in drawing 1) which detects the location of the direction of V since the same thing is used if attached to the two above-mentioned position sensors is explained to a detail. The explanation is omitted by ***** which gives the same sign as the sign given to the same part in the position sensor which detects the location of the direction of V to each part if attached to the position sensor (what is prolonged in the direction of H-H in drawing 1) which detects the direction of H.

[0015] The optical system 1 for image deflection amendment constitutes the afocal optical system which has the fixed lens 4 of the biconcave lens attached in the fixed lens holder 3 which is the holddown member which is located most ahead and fixed to a lens barrel 2 by the proper means, and the moving lens 5 of the biconvex lens located behind this fixed lens 4.

[0016] The image pick-up lens system 6 has two or more lenses which are not illustrated, and is behind the optical system 1 for image deflection amendment (the direction which goes to the right slanting upper part in drawing 1 is made into the front, the direction which goes to a left slanting lower part is made into back, the direction which goes to the left slanting upper part is made into a left, and the direction which goes to a right slanting lower part is made into the method of the right.). In expressing a direction in the following explanation, it shall depend in this direction. It is arranged. That is, a moving lens 5 is located ahead of the image pick-up lens system 6.

[0017] The moving lens 5 which is moving-part material is attached in the movable lens holder 7 which carried out the shape of an abbreviation ring, and this movable lens holder 7 is moved in said direction of H, and the direction of V by the driving means 8 and 8 of a moving coil type, for example while it is

supported maintaining a condition parallel to the fixed lens 4 by two suspensions which are not illustrated so that it may be movable.

[0018] Position sensors 9 and 9 are arranged on the V-V line which intersected perpendicularly mutually as a core, and the H-H line in optical-axis X-X of the image pick-up lens system 6, in order to consist of LED 10 and 10 which forms a light emitting device, and PSD 11 and 11 which forms a photo detector and to detect the location of a moving lens 5 in the direction of V, and the direction of H. As LED 10 and 10 is shown in drawing 1, the luminescence side is attached in the light emitting device mounting pieces 12 and 12 which were formed in the upper bed section and the left end section of the above-mentioned movable lens holder 7, and protruded on one toward the method of outside where the front is turned to. Moreover, PSD 11 and 11 is attached so that the fixed lens holder 3 may be countered with LED 10 and 10 at the photo detector fixed parts 13 and 13 by which projection formation was carried out in the direction of V, and the direction of H. In addition, the light-receiving sides 14 and 14 which carried out abbreviation band-like are established in the front face of PSD 11 and 11. The longitudinal directions of the light-receiving sides 14 and 14 which carried out band-like [this] are the detection directions 15 and 15 of PSD.

[0019] PSD 11 and 11 is fixed in the center of the principal pieces 17 and 17 of the photo detector holders 16 and 16 by proper approaches, such as adhesion or soldering, respectively, as shown in drawing 2 thru/or drawing 4 R> 4. The above-mentioned principal piece 17 succeeds in tabular [of an abbreviation rectangle], and projection formation of the stop section 19 is carried out for the adjustment arm 18 toward the left at one at one toward the upper part from the left end of a projection and the upper part of a principal piece 17 from the upper part of this principal piece 17.

[0020] And in the center of the rear face of the principal piece 17 of each photo detector holder 16, while projection formation of the engagement hole 20 is carried out at one, since the photo detector holder 16 rotated so that it may mention later is fixed in the location of arbitration, the long hole 21 on which an opening edge draws the locus of the shape of radii centering on the above-mentioned engagement hole 20 is formed in the stop section 19. In addition, PSD11 is prescribed in general that the detection direction 15 comes to a passage, and the center section comes right above the above-mentioned engagement hole 20 to the location of the engagement hole 20, when fixed to the photo detector holder 16.

[0021] Furthermore, the engagement projections 22 and 22 for engaging with the photo detector fixed parts 13 and 13 loosely with the engagement holes 20 and 20 of the above-mentioned photo detector holders 16 and 16, and supporting this to revolve are formed. He is trying, as for the above-mentioned engagement projections 22 and 22, for a V-V line or a H-H line to pass along the core. In addition, instead of forming the engagement projection 22 in the photo detector holder 16 at the photo detector fixed part 13 of the engagement hole 20 and the fixed lens holder 3, an engagement projection is prepared in the photo detector holder 16, and you may make it prepare an engagement hole in the photo detector fixed part 13 of the fixed lens holder 3 like this example.

[0022] A deer is carried out, and before PSD 11 and 11 attaches the moving lens 5 held at the movable lens holder 7 which is moving part at the lens barrel 2, its drive, etc., it is attached in the photo detector fixed parts 13 and 13 of a lens barrel 2 as follows.

[0023] The engagement projection 22 is made to engage with the engagement hole 20 of the photo detector holder 16 with which PSD11 was fixed in each photo detector fixed part 13 of the fixed lens holder 3. Then, in this condition, the photo detector holder 16 will be in the condition of having been attached in the photo detector fixed part 13 free [rotation] focusing on the engagement projection 22.

[0024] Next, it is made for the detection directions 15 and 15 of PSD 11 and 11 to serve as predetermined sense so that PSD 11 and 11 can detect migration of a moving lens 5 to accuracy as an amount of displacement in the direction of V, or the direction of H.

[0025] That is, the fixed lens holder 13 is first attached in an include-angle adjustment fixture (only the part mentioned later is illustrated about an include-angle adjustment fixture.). In addition, while he is trying to be moved in the direction of V, or the direction of H along with a V-V line or a H-H line at accuracy and the light emitting device irradiates the light from a light emitting device at PSD 11 and 11,

respectively, it is made to have the detection direction of the location of the moving lens by PSD 11 and 11 adjusted although an include-angle adjustment fixture avoids reference about the detailed structure. [0026] The output of PSD 11 and 11 is measured moving the light emitting device which consists of LED of the above-mentioned include-angle adjustment fixture etc. along with a V-V line or a H-H line in the direction of V, or the direction of H, the photo detector holder 16 is rotated in the direction of a clockwise rotation, or the counter clockwise direction so that the output of PSD 11 and 11 may become the optimal, and it is made to make the detection direction 15 in agreement with a V-V line or a H-H line.

[0027] And finally, temporary immobilization of the adjustment arm 18 is pinched and carried out at some include-angle adjustment fixtures 23 so that the photo detector holder 16 may not move, a screw 24 is inserted in in the long hole 21 of the stop section 19, the head is screwed in the screw hole 25 of the photo detector fixed part 13, and the photo detector holder 16 is fixed to the photo detector fixed part 13.

[0028] In addition, adjustment cost to adjust them, as the opening length in the longitudinal direction of the long hole 21 of the photo detector holders 16 and 16 described above the detection directions 15 and 15 of PSD 11 and 11 is determined by whether it is the need how much.

[0029] Thus, it sets to the position sensor of the optical system for this invention image deflection amendment. The ** which does not need components, such as a spacer which has various thickness by rotating the photo detector holder with which PSD was fixed, Even if it can adjust so that the detection direction of the location of the moving lens by PSD may be simply made in agreement with a V-V line or a H-H line, and it uses PSD with an inadequate appearance precision, it becomes possible to acquire the detection precision of the location of enough moving lenses, and becomes advantageous in respect of mass production nature and cost.

[0030] Moreover, by giving the precision needed in order to double the detection direction of PSD in the predetermined direction to an include-angle adjustment fixture, process tolerance of each part in connection with mounting of PSD can be made loose, and it becomes possible to lower a manufacturing cost.

[0031] In addition, although what attached PSD 11 and 11 (photo detector) in the fixed lens holder 3 (holddown member), and attached LED 10 and 10 in the movable lens holder 7 (moving-part material) was shown, LED 10 and 10 may be attached in the fixed lens holder 3, and you may make it attach PSD 11 and 11 in reverse with this in the above-mentioned example at the movable lens holder 7.

[Translation done.]

* NOTICES *

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] however, in order to put Spacer m between the photo detector holder j and the mounting section k and to make in agreement the detection direction i and the convention direction g also in the conventional example shown in above-mentioned drawing 6 R> 6 Many spacers m with which thickness differs are needed with the individual difference of PSD. It will adjust exchanging the spacer m with which thickness differs until the difference of the detection direction i and the convention direction g serves as tolerance, it is inefficient-like, and since components mark also increase, there is a new problem of leading also to a cost rise.

[0010] Therefore, the trouble in the above-mentioned conventional example is canceled, and the position sensor of the optical system for image deflection amendment which makes min the error of location detection of the moving lens by the position sensor is called for.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] An example of operation of the position sensor of the optical system for image deflection amendment is shown with drawing 2 thru/or drawing 4 , and this Fig. is the whole perspective view.

[Drawing 2] It is the rear view expanding and showing an important section.

[Drawing 3] It is the sectional view which meets the III-III line of drawing 2 .

[Drawing 4] It is the outline rear view expanding and showing the condition of adjusting the detection direction of a photo detector.

[Drawing 5] It is the rear view showing an example of the photo detector in the position sensor of the conventional optical system for image deflection amendment.

[Drawing 6] It is the rear view showing another example of the photo detector in the position sensor of the conventional optical system for image deflection amendment.

[Description of Notations]

1 [-- Moving-part material, 9 / -- A position sensor, 10 / -- A light emitting device, 11 / -- A photo detector, 15 / -- The location detection direction of a moving lens, 16 / -- A photo detector holder, 20 / -- An engagement hole, 22 / -- An engagement projection, 23 / -- Some include-angle adjustment fixtures]
-- The optical system for image deflection amendment, 3 -- A holddown member, 5 -- A moving lens, 7

[Translation done.]

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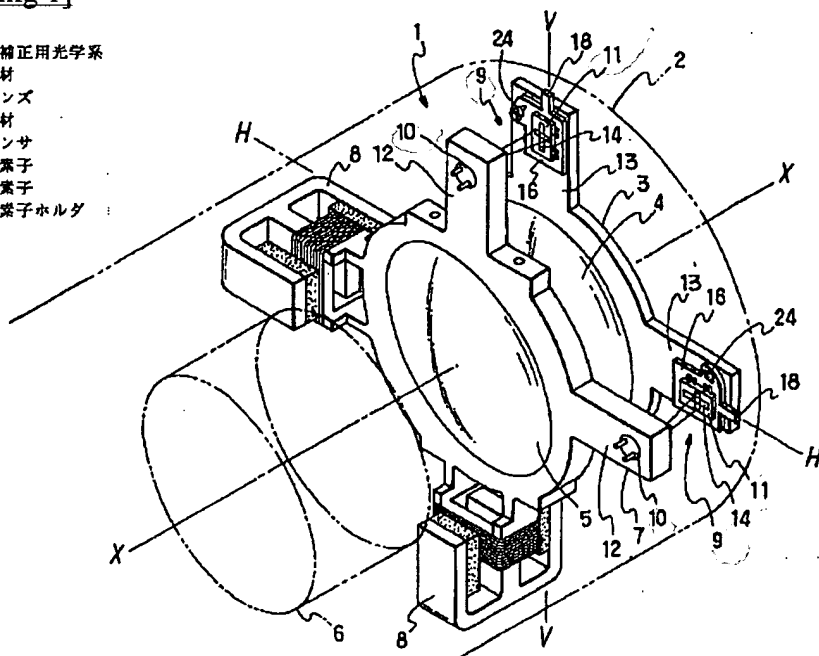
2. **** shows the word which can not be translated.

3. In the drawings, any words are not translated.

DRAWINGS

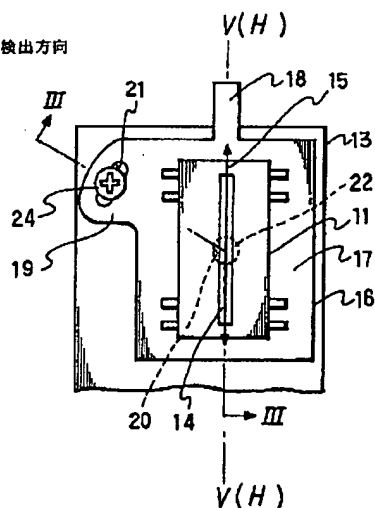
[Drawing 1]

- 1...像撮れ補正光学系
3...固定部材
5...可動レンズ
7...可動部材
9...位置センサ
10...発光素子
11...受光素子
16...受光素子ホルダ



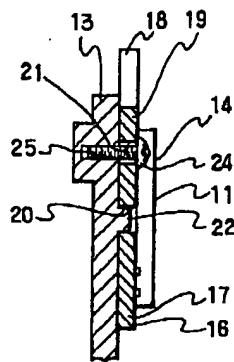
[Drawing 2]

- 11...受光素子
15...可動レンズの位置検出方向
16...受光素子ホルダ
20...係合孔
22...係合突起

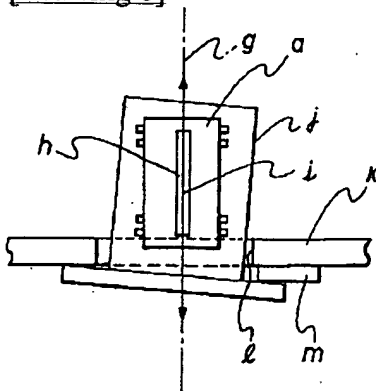


[Drawing 3]

- 11...受光素子
 16...受光素子ホルダ
 20...係合孔
 22...係合突起

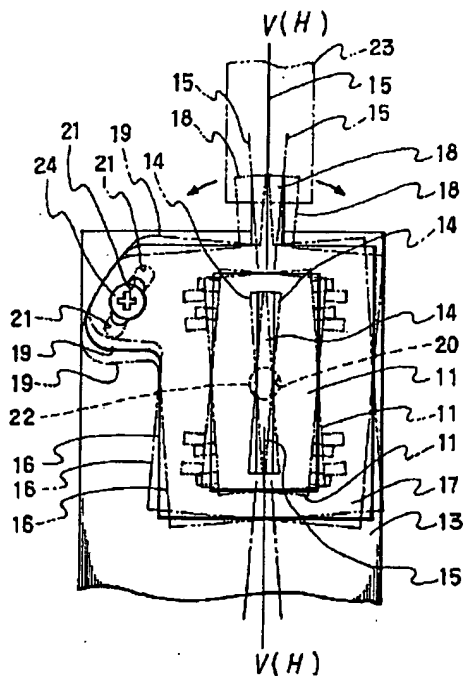


[Drawing 6]

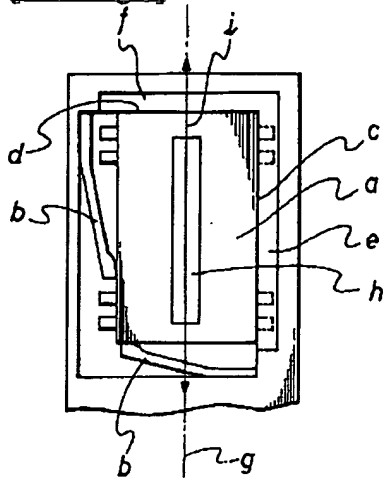


[Drawing 4]

- 11...受光素子
 15...可動レンズの位置検出方向
 16...受光素子ホルダ
 20...係合孔
 22...係合突起
 23...角度調整治具の一部



[Drawing 5]



[Translation done.]